An Improved Method For Opening Profile Zippers

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References Cited

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Description

FIELD OF THE INVENTION

The present invention relates to rib and groove profile zippers. This invention more particularly pertains to profile zippers as related to reclosable polymeric bags.

BACKGROUND OF THE INVENTION

Reclosable polymeric bags having interlocking pressure-sealable profile zippers have been available to consumers for nearly thirty years. Within this span of time, many improvements in design and manufacturing were implemented. Hundreds of new uses were discovered. Today, it is ubiquitous throughout the world.

Still, there is room for improvement. The required use of both hands for opening a reclosable polymeric bag has never been addressed and always been accepted. The lack of any pertinent prior art supports this assertion. The ability to open a bag effortlessly with one hand significantly improves convenience. It would benefit some of the "physically challenged" as well.

Variance in forces is another concern. Although minimized with profile designs such as U. S. Patent No. 5,558,613, there is still a fine balance between the consumer's ability to easily open a bag and preventing inadvertent penetration from the outside of the bag. This variance in forces places a constraint on profile design. Both closure strength and the force required for profile disengagement are compromised to some degree.

The two limitations just mentioned are actually inherent to the operational process. Said process is known in prior art as the profile disengagement process which involves the separation of two interlocking profile members. Two opposing flanges at the bag's mouth are held, one in each hand, at their longitudinal center. Said flanges are then pulled in opposite directions, away from the bag and perpendicular to the longitudinal axis of said profile. This process is typically enabled by some form of grip. Prior art has evolved without much change to the basic orientation of said grip. The surface texture is always situated to provide grip for pulling away from the bag and profile. For example, in reference to U.S. Patent No. 5,009,828, grips in the form of ribs are extruded longitudinally onto flanges across the lip of the bag. This is known in the art as grip strips. The aforementioned process for opening a profile zipper and its associated grip orientation pervade prior art and are currently the status quo.

BRIEF SUMMARY OF THE INVENTION

The present invention is an improved method to disengage interlocking members of rib and groove profile zippers without sliding elements. This process is enabled by a new grip arrangement. Both said process and said means are unobvious and novel as evidenced by 30 years of exclusion from prior art.

The present invention overcomes the two fundamental limitations discussed in the background. They are described as objectives below. Two additional features inherent to the present invention are also included.

One object of the present invention is to allow rib and groove profile zippers to be opened more conveniently with the use of just one hand.

Another object of the present invention is to provide a profile zipper design which maximizes closure strength of a polymeric bag from both within and without, while having no impact on the force required for disengagement. This eliminates a common design concern known in the art as "variance in forces".

Still another object of the present invention is to incorporate more stringent child-resistant properties into profile design.

Still another object of the present invention is to lessen the amount of raw materials required during production.

All the objectives are accomplished by first redefining the profile disengagement process as applied to reclosable polymeric bags. Prior art prescribes pulling the profile apart from it's lateral edge. The new process pushes the profile apart from it's longitudinal center. This redefined process, which is the present invention, shall be referred to herein as the "*pinch-snap process*". It begins by using one hand to pinch a closed profile zipper at its longitudinal center, with the thumb and forefinger each on one of the opposing members. The middle finger may be used in tandem with the forefinger for added stability. While maintaining pressure between thumb and fingers, mimic the action of "snapping your fingers" and slide the two interlocking members in opposite directions along the longitudinal axis. This breaks the profile seal and causes the polymeric bag to open at both corners of its mouth. As you continue sliding your thumb and fingers, both openings increase in size. Refer to *Detailed Description of the Preferred Embodiment* for a more technical and detailed description.

The pinch-snap process is enabled by a new grip arrangement. This new grip is positioned on or adjacent to both profile member surfaces opposite their interlocking elements. Said grip is situated in such a manner as to provide surface friction in both directions along the longitudinal axis of the profile. This differs considerably from prior art, which provides surface friction at right angles away from the profile's longitudinal axis. Texture orientation, relative position to profile, and pure intent are attributes of the grip arrangement which are unique to prior art and therefore characterize or earmark the pinch-snap process. The *Detailed Description of the Preferred Embodiment* section offers, by way of example rather than limitation, three grip arrangements which are all embodiments of the present invention.

The pinch-snap process prescribed by the present invention pushes the profile apart from it's longitudinal center. Throughout this process, both profile surfaces opposite the interlocking elements maintain a parallel or "balanced" relationship. In the case where force is inadvertently applied to one of the profile's lateral edges, the parallel relationship becomes skewed or "unbalanced". A profile can be designed to lock in this situation, providing maximum closure strength thereof. This aspect of the present invention serves as the basis for a profile design which offers minimal resistance when balanced and maximum closure strength when unbalanced. This enables effortless consumer access when using the pinch-snap process while providing maximum closure strength from both within and without the bag. Prior art concerns with "variance in forces" are thereby eliminated. The present invention discloses a simple profile design which takes advantage of this particular attribute. Refer to *Detailed Description of the Preferred Embodiment.*

Grip strips are unnecessary within the scheme of the pinch-snap process. Its omission from design saves on raw materials during manufacturing. Also, the absence of grip strips, the aforementioned balanced profile seal and the non-intuitive nature of the pinch-snap process, collectively promote child-resistant properties. These properties exceed similar claims in prior art (see U.S. Patent No. 5,931,582 and 5,711,609) by offering a higher degree of convenience while increasing overall effectiveness.

To reiterate the present invention, the pinch-snap process is embodied by a type of grip arrangement unique to prior art. When implemented, it results is a polymeric bag with the following advantages:

1. Can be conveniently opened with one hand.
2. Eliminates "variance in forces" design concerns.
3. More stringent child-resistant characteristics.
4. Requires less raw material during manufacturing.

The above summary of the present invention is not intended to describe each illustrated embodiment or every implementation of the present invention. The figures and the detailed description that follow more particularly exemplify these embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates first step of pinch-snap process according to present invention.

FIG. 1A is an enlarged top view of profile zipper taken at reference line 1A--1A of FIG. 1.

FIG. 2 illustrates second step of pinch-snap process according to present invention.

FIG. 2A is an enlarged top view of profile zipper taken at reference line 2A--2A of FIG. 2.

FIG. 3 illustrates third step of pinch-snap process according to present invention.

FIG. 4 illustrates fourth step of pinch-snap process according to present invention.

FIG. 5 is a cross-sectional view of a profile zipper in the balanced state..

FIG. 5A is a cross-sectional view of a profile zipper in the unbalanced state..

FIG. 6 is a front elevational fragmentary view of a polymeric bag with a non-slip coated grip arrangement which is an embodiment of the present invention.

FIG. 7 is a cross-sectional fragmentary view of a profile zipper with a "wet friction" integral grip arrangement which is another embodiment of the present invention.

FIG. 8 is a front elevational fragmentary view of a polymeric bag with an embossed grip arrangement which is another embodiment of the present invention.

FIG. 8A is an enlarged cross-sectional fragmentary view of profile zipper taken at reference line 8A--8A of FIG. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The pinch-snap process is comprised of four steps. The first two steps depicted in FIG.1 and FIG. 2 respectively, break the seal of the profile zipper. The remaining two steps depicted in FIG. 3 and FIG. 4 respectively, separate the remaining portion of the profile still engaged after the seal is broken.

Referring to FIG. 1 and FIG. 1A, the pinch-snap process begins with using one hand to pinch profile zipper 1 at the center 11, of its longitudinal axis with the thumb and forefinger each on one of the interlocking members 12 and 13 respectively. The middle finger may be used in tandem with the forefinger for added stability.

Referring to FIG. 2 and FIG. 2A, while maintaining pressure between thumb and fingers, slide thumb in direction 14 along the longitudinal axis 17, of the profile. Simultaneously slide fingers in the opposite direction, which is direction 15, along the longitudinal axis 17. The operation just described mimics the familiar action of "snapping your fingers". As you perform said operation the two interlocking members of profile 1 will slide in opposite directions along the longitudinal axis 17. This will break the seal by causing the opposing profile members to separate at both corners 16, of the mouth on the bag. As you continue to move thumb and fingers in directions 14 and 15 respectively, the opposing profile members continue to separate, as the openings at both corners 16 increase in size and work their way towards the longitudinal center 11.

At the point in the pinch-snap process when the thumb and fingers have reached their limits of range of motion, the center of the profile's longitudinal axis may still be engaged. If this is the case, continue on to steps three and four in FIG. 3 and FIG. 4 respectively.

Referring to FIG. 3, place forefinger into profile opening 18 adjacent to thumb.

Referring to FIG. 4, sweep forefinger back in direction 19, through engaged center 11 of said profile to achieve total separation of opposing profile members

FIG. 5 depicts a longitudinal coextensive profile in the balanced state without any force being applied to lateral edges 50. As noted in the Brief Summary, this state allows for profile disengagement. Thumb and forefinger are placed on parallel surfaces 51and 52 respectively. This parallel relationship is maintained throughout the disengagement process, causing the male and female members to move apart in opposite directions along line 53 when separating. Elements 54 and 55 of the female member therefore avoid engagement with wedges 56 and 57 of the male member. Both elements 54 and 55 are of equal length and should conform to the circular contour of element 58 of the male member. Designing elements 54 and 55 to extend further along the contour of element 58 will increase the amount of force necessary for profile disengagement.

If force is inadvertently applied to either lateral edge 50, the profile becomes unbalanced as depicted in FIG. 5A. The circular mating contours of elements 54 and 55 on the female member and element 58 of the male member allow both members to rotate away from the lateral edge 50 where force is being applied. This will engage wedge 56 and lock female

element 54. As the force at lateral edge 50 increases, male element 58 flexes at it's base 59, and applies more pressure on locked female element 54

One embodiment of the present invention is a grip arrangement in the form of a non-slip coating applied via aerosol spray. U.S. Patent No. 5,453,219, hereby incorporated by reference, discloses an aerosol composition for producing a surface having an abrasive grit adhered thereto. Said composition is comprised of an abrasive grit, a binder solution which is suitable for affixing said grit onto a surface comprised of a polymeric resin and an organic solvent which dissolves said resin, the resin being capable of adhering to said surface and to said grit, and a liquid propellant.

As the aforementioned pinch-snap process clearly shows in FIG. 1 and FIG. 2, the hand pinches the profile zipper at the center of its longitudinal axis and does not release until after the seal is broken. This is the only area on the polymeric bag which necessitates a grip. A coextensive grip is unnecessary. Consequently, the "target area" for the aerosol application of the non-slip coating is the center of the profile zipper's longitudinal axis as shown in FIG. 6-60. Depicted as section 60, the target area extends outward from the profile's longitudinal center, 0.5" in both directions along the longitudinal axis and 0.5" down from the lip of the bag. The disclosed target area dimensions are intended as examples, rather than limitations. There should be a mirror image of this grip arrangement on the opposite exterior wall of the polymeric bag. Said target area should be kept to a minimum length along the longitudinal axis to prevent any significant obstruction when sliding fingers over the profile 61 during the sealing thereof.

Many viable means for applying aerosol coatings are available. For example, U.S. Patent No. 5,464,154 and 5,670,202 disclose several processes which provide a momentary spray using a mask for accuracy and peripheral vacuum to collect any overspray. According to prior art, the typical manufacturing process starts with profile members being extruded onto a continuous polymeric sheet. The sheet is folded and heat-sealed to form a chain of pouches. These pouches are then severed at the seal to form individual reclosable polymeric bags. After the heat-sealing process, the physical dimensions of each individual bag are defined, thereby making it possible to target the longitudinal center. Before severing, the bags are still connected in a continuous chain making it possible to control their positioning. Consequently, the non-slip coating should be applied just after the sealing station but before the severing station.

The following grip arrangements are alternate embodiments of the present invention. Although coextensive grips are unnecessary, the manufacturing process is simplified with a coextruded profile and grip.

FIG. 7 is another embodiment of the present invention in the form of an integral grip arrangement. The coextruded longitudinally coextensive profile sections 70 are of a copolymer blend consisting of a non-slip "wet friction" compound. U. S. Patent No. 5,314,940, hereby incorporated by reference, describes a compound with a surface friction that increases under damp conditions. Said compound does not use any particulate material and includes a hydrogenated polybutene plasticizer as one of its preferred formulations. Amoco Chemical Company of Chicago, Illinois manufactures said compound under the designation H-300. The walls of the polymeric bag 71 are bonded to the inner